

# National Bureau of Standards

## Certificate of Analysis

### Standard Reference Material 277

#### Tungsten Concentrate

(In cooperation with the American Society for Testing and Materials)

This material is in the form of powder ( $<0.15$  mm) intended for use in checking chemical methods of analysis and in calibration with instrumental methods of analysis.

<u>Constituent</u>	<u>Certified Value<sup>1</sup> (wt%)</u>	<u>Estimated Uncertainty<sup>2</sup> (wt%)</u>
WO <sub>3</sub>	67.4	0.3

(Results are based on samples dried at 110 °C for one hour)

<sup>1</sup> The certified value is the *present best estimate* of the "true" value based on the results of the co-operative program for certification.

<sup>2</sup> The estimated uncertainty is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability for samples of 1 g or more (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination.)

**CAUTION:** The material for this SRM primarily was derived from wolframite ores. It is, however, a mixture of concentrates from China, Thailand, and USA that contains titanium, niobium, tantalum, and tin in amounts not normally encountered in most wolframite concentrates. These constituents may interfere in the "classic" chemical procedures and may necessitate appropriate changes in methodology. Also, x-ray fluorescence methods of analysis that use SRM 277 to make relative measurements of "pure" wolframite (or scheelite) concentrates may exhibit systematic errors because of the unusual constituents contained in this concentrate.

The overall coordination of the technical measurements leading to certification were performed under the direction of J. I. Shultz, Research Associate, NBS-ASTM Research Associate Program.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R. E. Michaelis.

Washington, D.C. 20234  
October 24, 1978

J. Paul Cali, Chief  
Office of Standard Reference Materials

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**PLANNING, PREPARATION, TESTING, ANALYSIS:** The material for SRM 277 was carefully selected and provided to NBS by GTE Sylvania, Towanda, Pennsylvania, courtesy of J. Demangone. At Sylvania, the material was crushed and ground to a fine powder. At NBS the material was sieved ( $<0.15$  mm) and thoroughly blended.

Homogeneity testing of selected samples representative of the lot of SRM 277 was performed by an x-ray fluorescence technique by R. E. Michaelis. The material variability was determined to be within  $\pm 0.1$  (wt%) of  $\text{WO}_3$ .

Cooperative analyses for certification were performed in the following analytical laboratories:

Alfred H. Knight International, Ltd., Cheshire, U.K. - J. F. L. Knight.

Benedict Kitto and Sons, London, U.K. - R. Peck.

General Electric Company, Cleveland, Ohio - J. Rynasiewicz and J. W. Fulton.

GTE Sylvania, Towanda, Pa. - R. Dyck; and Waltham, Mass. - J. F. Cosgrove.

Hermann C. Starck, Berlin, Germany - O. Hilmer.

Ledoux & Company, Teaneck, N. J. - S. Kallmann.

National Bureau of Standards, Washington, D.C. - E. R. Deardorff.

Sandvik, A. B., Stockholm, Sweden - K. Käär; and Sandvik Asia Ltd. - N. R. Sanjana.

Spectro Chem Labs, Inc., Franklin Lakes, N. J. - E. W. Hobart.

Treibacher Chemische Werke, Treibach, Austria - Z. Otto.

Westinghouse Electric Corporation, Bloomfield, N. J. - P. J. Walitsky.

Union Carbide Corporation, Bishop, Calif. - E. C. Gibbs and K. M. Wilder; and Niagara Falls, N. Y. - P. Greenberg.

VEW Ternitz, Austria - A. J. Leeb.

**NOTE:** Details regarding the methodology employed in the analysis of this SRM, along with other pertinent information, will appear in a separate publication.

**ADDITIONAL INFORMATION OF THE COMPOSITION:** Certification is made only for the  $\text{WO}_3$  content; however, SRM 277 contains additional constituents of interest as indicated below. These are *not certified* and are provided for information only. Table 1 lists those constituents for which data were received from two or more laboratories that were in good agreement. (Most of these are expected to be proposed for certification at a later date and, therefore, an indication of the uncertainty also is given.) Table 2 lists those constituents for which data were received from a single laboratory (or discrepant data from two or more laboratories).